Moselley

LABORATORY SERVICES BRANCH

WORKLOAD PLANNING

DECEMBER, 1980

TD
178
.C36
B48
1980

Ministry
of the
Environment
Ontario

The Honourable
Harry C. Parrott, D.D.S.,
Minister

Graham W. S. Scott, Q.C.,
Deputy Minister

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LABORATORY SERVICES BRANCH

WORKLOAD PLANNING, DECEMBER, 1980

Prepared, November - December, 1980

J.N. Bishop

LABORATORY SERVICES BRANCH

WORKLOAD PLANNING REVIEW 1980

I INTRODUCTION

As part of the Laboratory Services Branch objective setting, a thorough workload planning exercise was performed with all of the Branch's clients. The purpose of the exercise was to clarify the workload each client had required in previous years, to ascertain whether the current level of analytical allocation was sufficient to meet client needs, and to identify any new initiatives that clients knew of, which could alter their analytical requirements.

At the onset, it was felt that these goals objectives would be easily met and would form the basis for a contractual arrangement between the regions and the central laboratory. However, as the meetings progressed, it became apparent that the issues being discussed could be used to help the laboratory in workload planning, ~~but could also~~ serve to strengthen the laboratory's component of the Resource Allocation and Priority Review and the proposed use of a Management by Results approach in managing the Laboratory Services Branch operation.
The net result was that the client/laboratory meetings provided the following information:

- numerical test load requirements for each client group,
- discussion of priorities associated with each ~~sample~~ program,
- identification of problem areas in sampling,
- identification of shortfalls in past analytical performance (throughput time, sensitivity, interpretation),
- exchange of ideas to improve client/laboratory relationships and promote easier planning mechanisms for the future,
- identification of improved data recording/reporting/transmission techniques for various laboratory operations,
- indicated the need for follow-up of recommended changes.

Each meeting was minuted and resulted in numerous action items. This review of the overall planning exercise attempts to outline the test load agreements, action items, and to specify working agreements made at the meetings.

II WORKLOAD AGREEMENT

Each meeting began with a discussion of workloads, from the client's specific needs to the general requirements of all Ministry of the Environment analytical requirements. The pertinent features of this workload are displayed in the following figures and diagrams.

Figure 1 shows the total analytical capacity of the Ministry, broken into regional and ~~head office~~ central laboratories.

FIGURE 1

TESTS PERFORMED

(AVERAGE OF 1978/79 and 1979/80)

Central Laboratory				
Water Quality		674000		
Inorganic Trace Contaminants		292000 x2		584,000 277,900 for 79/80
Organic Trace Contaminants		50000		306,100 for 78/79
Pesticides		8000		
Microbiology		138000		
	SUB TOTAL	1162000	1162000	
Regional Laboratories				
London		200000		
Thunder Bay		105000		
Kingston		137000		
	SUB TOTAL	442000	442000	
	TOTAL		1604000	

Because selection of any one year period might provide a biased picture, it was decided to provide figures based on the average of the"two year" period 1978/80. ?

While no contractual figures were arrived at (or attempted), there was general agreement that each Laboratory Services Branch unit would continue to provide a level of service at least as high as that reflected in the 1979/80 figures. It is hoped that clients and the appropriate Laboratory Services Branch groups can develop an actual contract for total workloads for 1981/82, but for now, the guidelines provided and discussed at the workload planning meetings in 1980, will form the basis of the 1980/81 workload objectives.

Figure 2 shows the way the Ministry used the analytical capacity of its regional and central laboratories. Figures 3-8 show the allocation of each region's analytical needs to the various laboratory groups. Figure 9 indicates each Laboratory Services Branch Section's workload by region.

A major obstacle in determining workload allocations was pointed out during several regional meetings. This is the problem of charging the analytical requirements for a given program to the correct data user. For example, the river monitoring program is coordinated by Water Resources Branch but sampling and assessment are carried out by each region. Sound arguments could be made for charging each region for its share or for charging the entire program (some 15500 tests) to Water Resources Branch. At present, this program is charged against Water Resources Branch.

Similarly, Air Resources Branch's Phytoxicology group coordinates surveys of environmental damage to vegetation, and in support of this each region collects vegetation which is analyzed for various constituents. Once again, this program could be charged to Air Resources Branch or to each region. At present, it is charged against the regions.

Figures 10,11 and 12 show the large analytical requirement for air and water sampling programs. These figures also illustrate some of the differences between Air Resources Branch and Water Resources Branch in their approaches to sampling.

The Water Resources allocation is considerably higher than that for Air Resources or Pollution Control Branches. There are several reasons for this.

First, the practice of charging routine water monitoring programs to Water Resources Branch, while most routine air monitoring programs are charged to the regions, distorts the balance between the head office branches. Second, Air Resources obtains the equivalent air monitoring data by fine fixed instrumentation to that acheived by the Water Resources Branch using traditional sampling/analytical techniques.

Finally, Air Resources Branch uses mobile laboratory units which provide considerable analytical data that would otherwise come from traditional central laboratory analysis.

The list contains numerous categories that are no longer used or properly describe the work. Also, programs like Dichotomous Filters (ARB), Fluoride Study (ARB), Stratford-Avon (SW, WRB, PCB), Characterization of Hauled Liquid Industrial Wastes, etc., are not listed but should be. Upon receipt of this workload planning document, the designated staff are requested to examine their current program titles and make changes to the list as required. The changes should be compatible with the revised coding system being introduced as part of the new Laboratory Information System. Please arrange to have this material ready by December 17, 1980.

FIGURE 2

MINISTRY USE OF REGIONAL AND CENTRAL LABORATORY SERVICES

CLIENT	TEST REQUIREMENT (1979/80)
Southwest Region (SWR)	215400
Central Region (CR)	284000
West-Central Region (WCR)	149000
Southeastern Region (SER)	158000
Northeastern Region (NER)	209000
Northwestern Region (NWR)	99000
Water Resources Branch (WRB)	328000
Air Resources Branch (ARB)	20500
Pollution Control (PCB)	24000
Other (MOH, MNR, FED)(MISC)	64000
TOTAL	1550900

1162,000
442,000
1604,000
1,550,900
53,100 not used.
≈ 5% of. the lab capacity not used!

DIAGRAM: Use of Laboratory Analytical Capability by Client Branches and Regions

≈5% not used

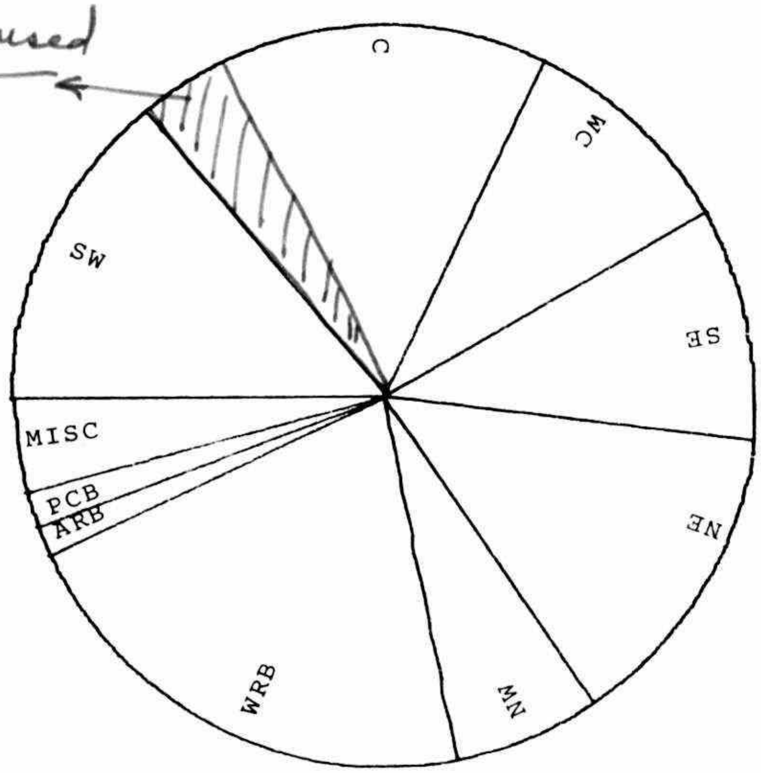


FIGURE 3

SOUTHWESTERN REGION

(1979/80)

Test Allocation:	215400
Regional Microbiology (RM)	38000
Regional Chemistry (RC)	144000
Water Quality Section (WQS)	5000
Inorganic Trace Contaminants Section (ITC)	22000
Organic Trace Contaminants Section (OTC)	6000
Pesticides (PEST)	400
TOTAL	215400

DIAGRAM: Regional and Central Laboratory use by Southwestern Region

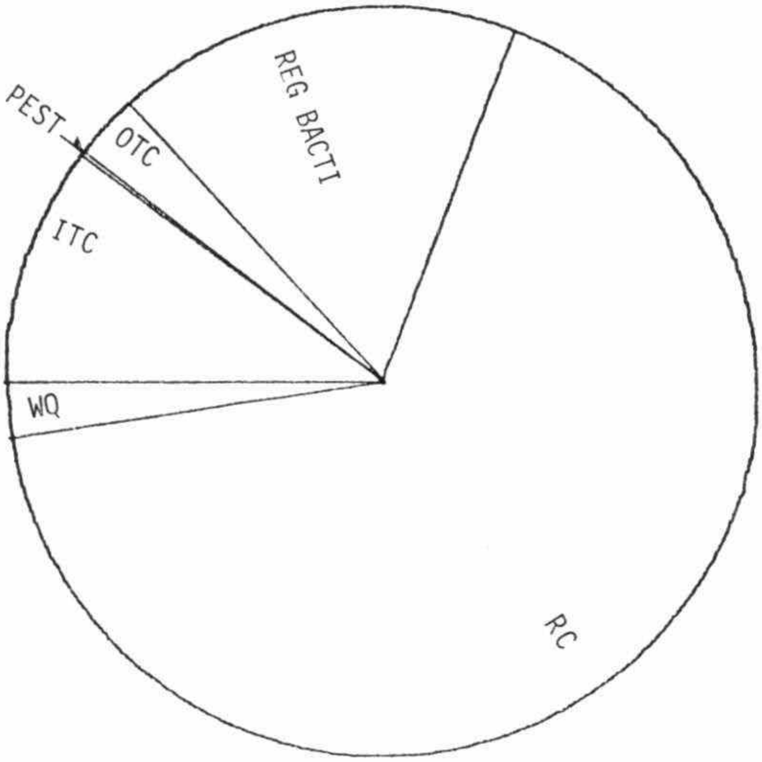


FIGURE 4

CENTRAL REGION

Test Allocation:	284000
Water Quality Section (WQS)	154800
Inorganic Trace Contaminants Section (ITC)	69200
Organic Trace Contaminants Section (OTC)	12900
Pesticides(PEST)	1000
Microbiology (MICRO)	46100
TOTAL	284000

DIAGRAM: Central Laboratory Use by Central Region

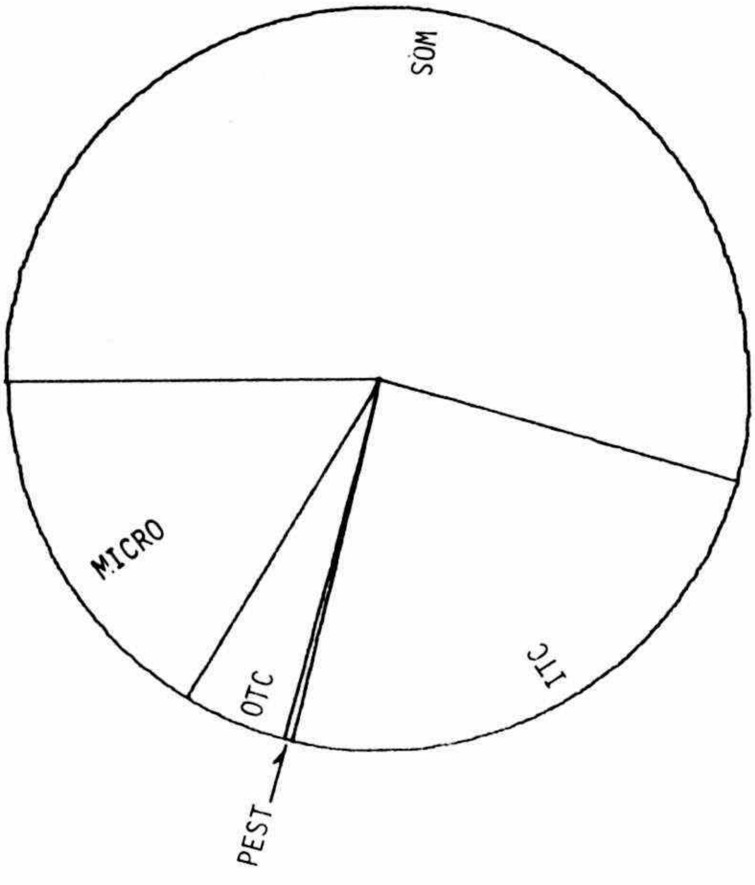


FIGURE 5

WEST CENTRAL REGION

Test Allocation:	149000
Water Quality Section (WQS)	75700
Inorganic Trace Contaminants Section (ITC)	42400
Organic Trace Contaminants Section (OTC)	5900
Pesticides (PEST)	300
Microbiology (MICRO)	24700
TOTAL	149000

DIAGRAM: Central Laboratory use by West Central Region

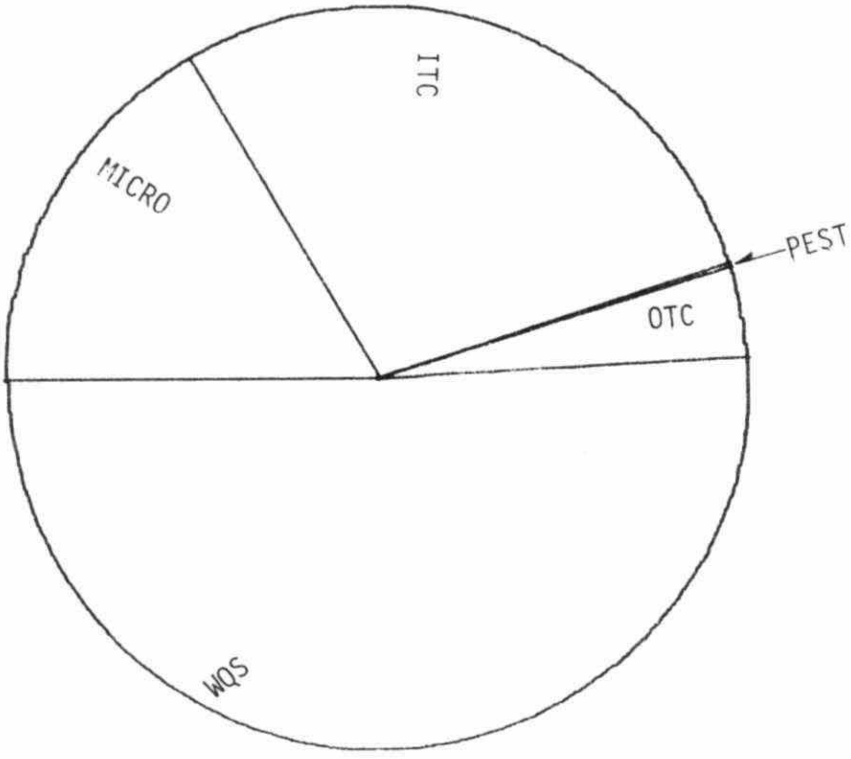


FIGURE 6

SOUTHEASTERN REGION

Test Allocation:	158000
Regional Microbiology (RM)	45100
Regional Chemistry (RC)	80700
Water Quality Section (WQS)	13200
Inorganic Trace Contaminants Section (ITC)	13600
Organic Trace Contaminants Section (OTC)	5200
Pesticides (PEST)	200
Microbiology (MICRO)	-
TOTAL	158000

DIAGRAM: Regional and Central Laboratory use by Southeastern Region

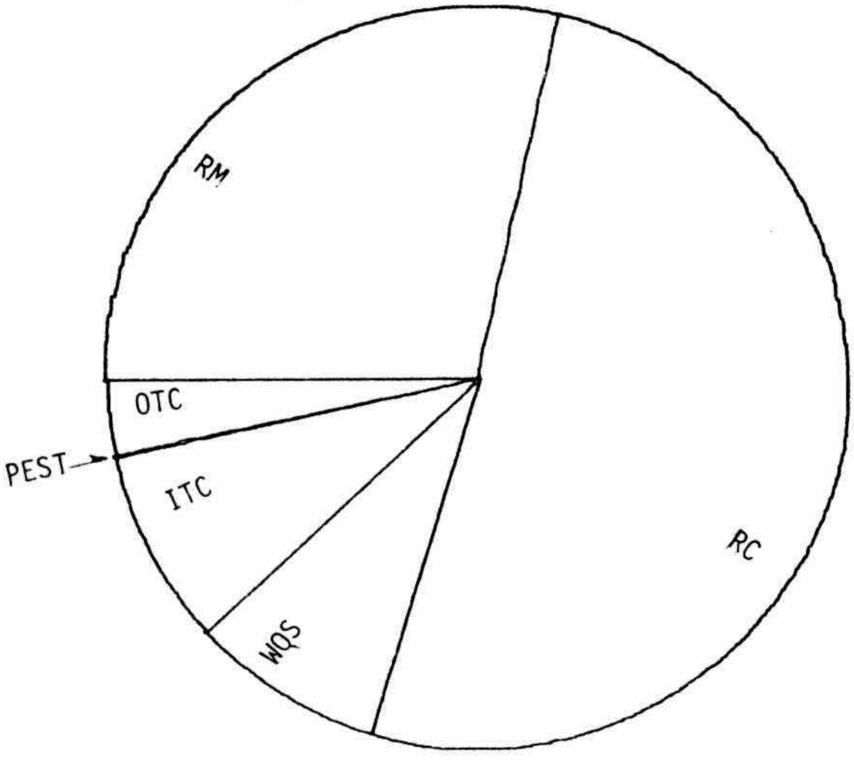


FIGURE 7

NORTHEASTERN REGION

Test Allocation:	209300
Regional Microbiology(RM)	-
Regional Chemistry (RC)	-
Water Quality Section (WQS)	145800
Inorganic Trace Contaminants Section (ITC)	54700
Organic Trace Contaminants Section (OTC)	6800
Pesticides (PEST)	300
Microbiology (MICRO)	1700
TOTAL	209300

DIAGRAM: Central Laboratory use by Northeastern Region

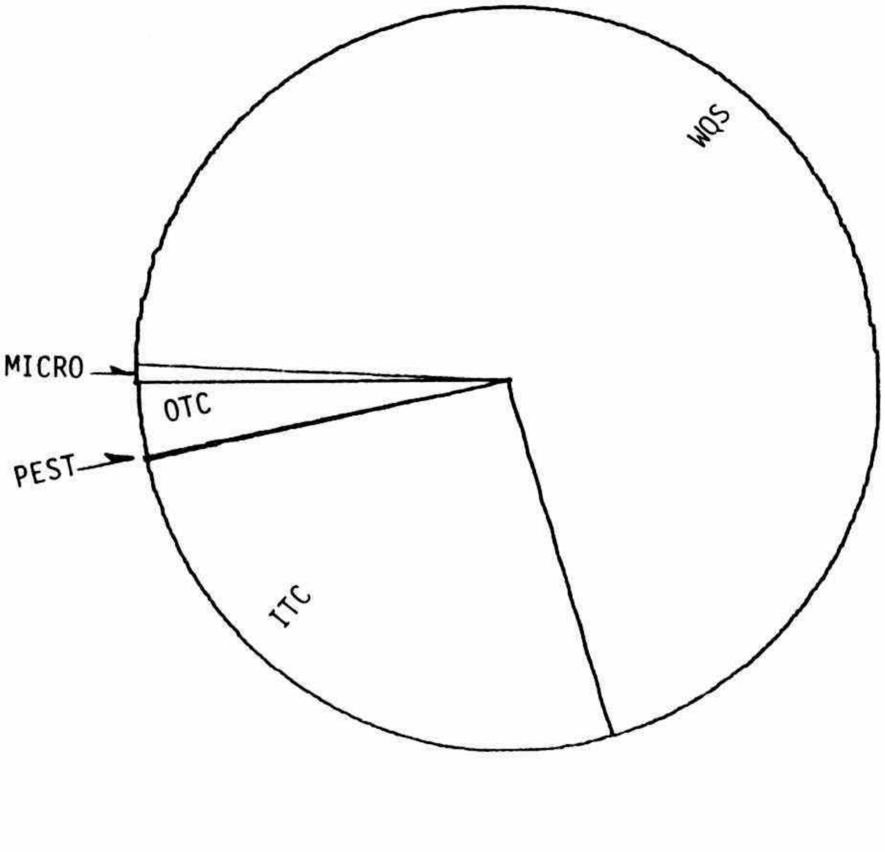


FIGURE 8

NORTHWESTERN REGION

Test Allocation:	99000
Regional Microbiology (RM)	33200
Regional Chemistry (RC)	58800
Water Quality Section (WQS)	1500
Inorganic Trace Contaminants Section (ITC)	4000
Organic Trace Contaminants Section (OTC)	1200
Pesticides (PEST)	300
Microbiology (MICRO)	-
TOTAL	99000

DIAGRAM: Regional and Central Laboratory use by Northwestern Region

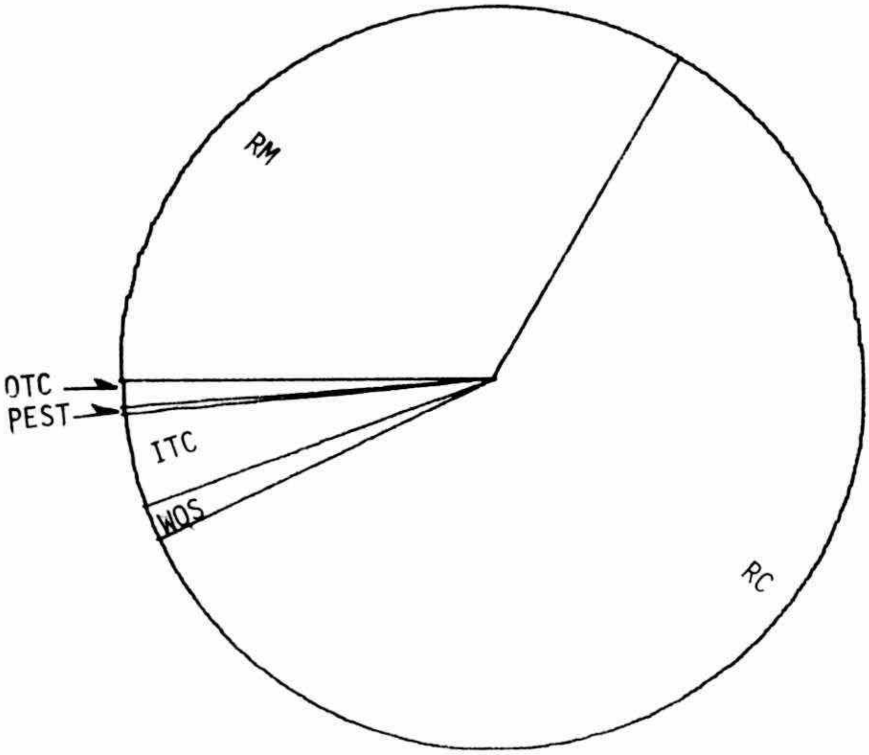


FIGURE 9

CLIENT DISTRIBUTION :

LABORATORY SERVICES BRANCH WORKLOAD BY REGION, BRANCH

CLIENTS	LABORATORY SERVICES BRANCH - number of tests performed, 1979/80 -					REGIONAL LABORATORY	TOTAL
	WQ	ITC	OTC	PESTS	MICRO		
Southwestern Region	5000	22000	6000	400	-	182000	215400
Central Region	154800	69200	12900	1000	46100	-	284000
West-Central Region	75700	42400	5900	300	24700	-	149000
Southeastern Region	13200	13600	5200	200	-	125800	158000
Northeastern Region	145800	54700	6800	300	1700	-	209300
Northwestern Region	1500	4000	1200	300	-	92000	99000
Water Resources Region	224100	36700	1400	2800	57000	6000	328000
Air Resources Branch	-	8300	12000	200	-	-	20500
Pollution Control Branch	18000	6000	-	-	-	-	24000
Other (MOL, MOH, FED)	29000	21000	1600	2400	2000	8 000	64000
Combined	667100	277900	5300	7630	131500	413800	1551200

↓

ITC average of {1978/79, 79/80} → 292,000 x 2 = 584,000
→ 277,900
So productivity in 78/79 is → 306,100
277,900
drop in productivity in 79/80 is → 28,200 i.e ≈ 10%

FIGURE 10

AIR SAMPLING

1.	Hi-vols (including candles, plates dustfalls)	86700
2.	Phytotoxicology samples (vegetation and soil)	33500
3.	SES - APIOS Testing	50000
4.	ARB Projects	20500
	TOTAL	190700

DIAGRAM: Components of Air Sampling Requiring Central Laboratory service

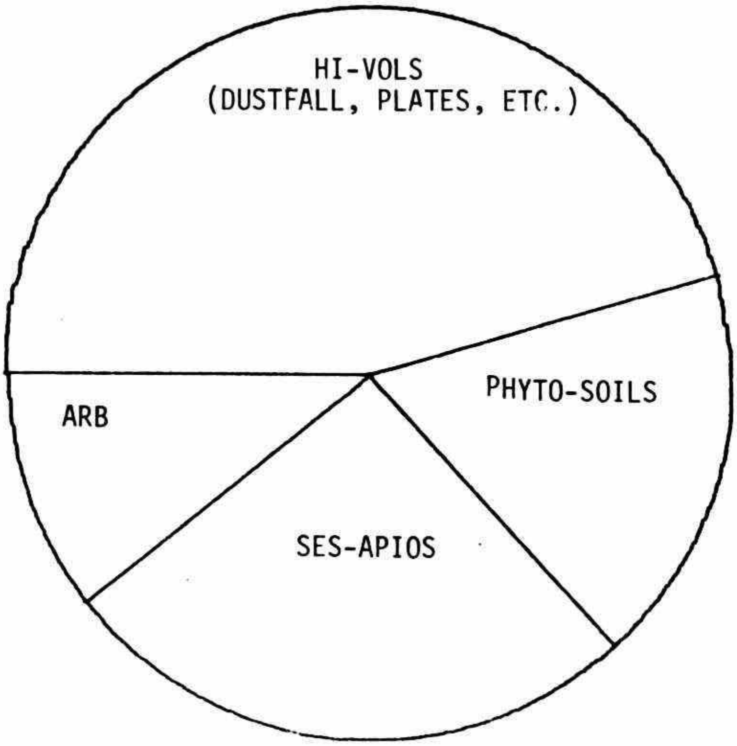


FIGURE 11

AIR SAMPLING - ITEMIZED

		SW	C	WC	SE	NE	NW	TOTAL
1.	Hi-vols, candles, plates, dustfalls	10500	43600	16200	2200	8800	5400	86700
2.	Phytotoxicology Samples	4600	9400	7500	3900	2800	5300	33500
3.	SES-APIOS Air Samples:	50000						50000
4.	ARB Testing: 20500							20500
				TOTAL AIR TESTS				190700

DIAGRAM: Detailed Components of Air Programs requiring Central Laboratory service

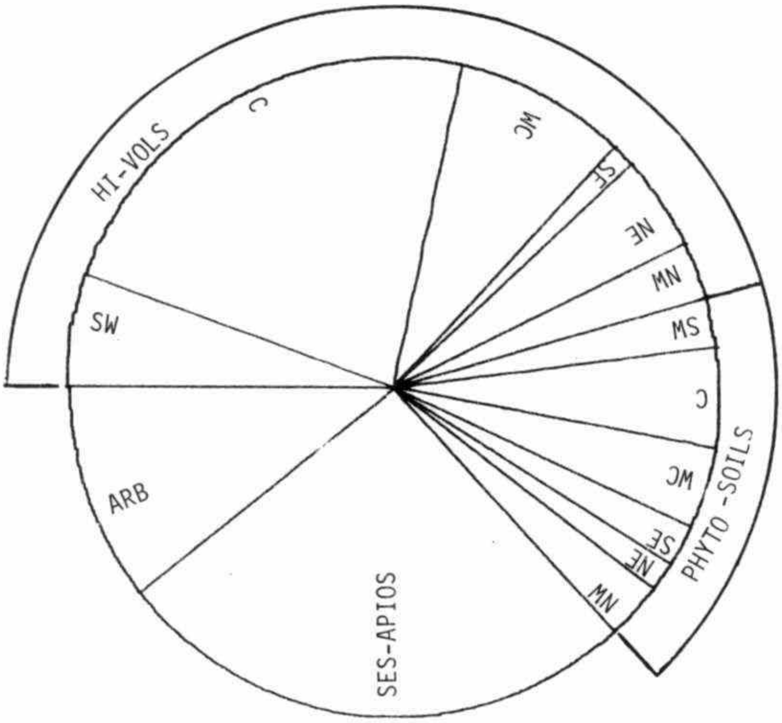
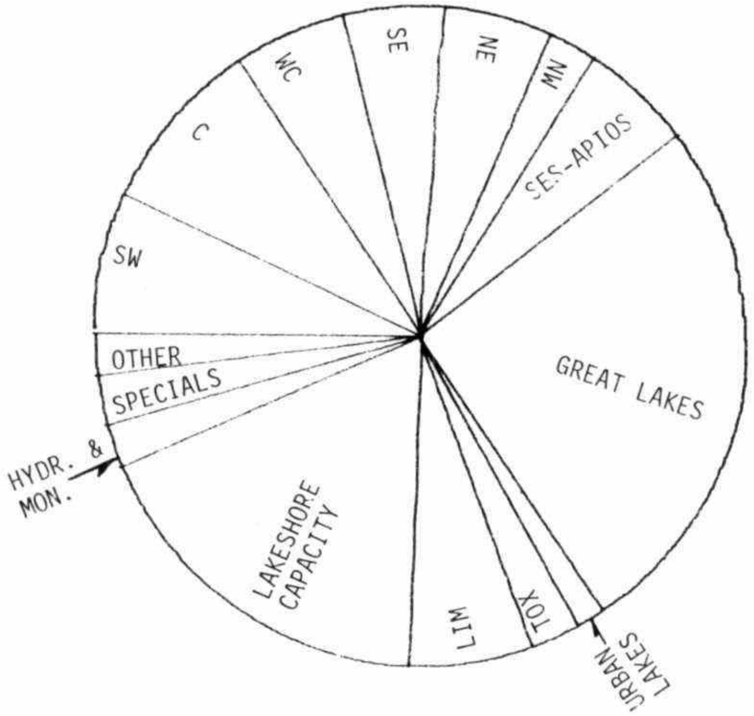


FIGURE 12

WATER SAMPLING PROGRAMS

			SW	C	WC	SE	NE	NW	TOTAL
1.	Regional Water Programs (RIWQM, Rec. Lakes, Self-help)		31300	39000	25000	23500	24300	20900	164000
2.	SES-APIOS Water:								25000
3.	WRB Programs:	Great Lakes							118000
		Urban Lakes							6500
		Toxicity							11000
		Limnology							29000
		Lakeshore Capacity							81000
		Hydrology and Monitoring							9500
		Special Studies (Grand River, Waterfront etc)							11000
		Other							9000
							TOTAL		464000

DIAGRAM: Water Programs requiring Central Laboratory Services



III ACTION ITEMS - GENERAL

1. Description of programs

Program allocation

At present, samples are divided into the following categories for each region:

	ACTION BY
INDUSTRIAL ABATEMENT Survey Waste Disposal Water Supply	W. Vrooman J. Moore, J. Wesno F. Durham T. Armstrong D. Currie M. Caranci
MUNICIPAL & PRIVATE ABATEMENT STP WW Landfill Survey	J. Stasiuk J. Bray I. Simmonds G. Trewin A. Symmonds J. Moore J. Wesno
UTILITY MANAGEMENT STP WW Other	I. Munro E. Ladbrooke B. Hansler A. Thomas B. Gibson L. South
TECHNICAL SUPPORT STP WW *River Monitoring *Recreational Lakes	W. Creighton C. Schenk R. Stewart B. Singh D. Aitkens J. Fry

MUNICIPAL SURVEY

*Other Survey
*Air Assessment
*Phytotoxicology
*SES-Air
*SES-Water
Self-help
Miscellaneous
*Sludge Util.
Experience 80

*denotes programs that need (a) clarification (what are they?)
(b) elimination (SES is no longer a current program).

Clearly, these divisions and classifications were made in an attempt to bring order to the laboratory's record-keeping. Just as clearly, some of the categories need to be changed. Programs like APIOS, Liquid Industrial Wastes, and so on, may need to be added, while others can be deleted. Some are grouped incorrectly.

Similarly, the head office groups have categories that require re-thinking.

ACTION BY

F. Fleischer
S. Salbach
R. Hore
T. Brydges

WATER RESOURCES BRANCH

River Monitoring
Great Lakes
Urban Lakes
Toxicity
Limnology
Lakeshore Capacity
Hydrology and Monitoring
Grand River
APIOS-Water
River Studies
Waterfront
SES
Other

WASTE MANAGEMENT	G.M. Wood
CHLIW	B. Boyko
Other	E. Turner
	W. Williamson
	P. Isles
	J. Hawley
POLLUTION CONTROL BRANCH	G. Van Fleet
Wastewater	P. Seto
Water	G. Missingham
Applied Science	
Other	
PROJECT COORDINATION	C. Wilson
York-Durham	T. Yakutchik
Ground Water	
Other	
AIR RESOURCES BRANCH	L. Shenfeld
Phytotoxicology	S. Linzon
Air Quality	G. Van Volkenburgh
NEMP	B. Martin
TDA	B. Caton
Organics	M. Lusis
APIOS-Air	E. Singer
Source Assessment	H. Ozvacic
Other	
NON-MOE	B. Neary
Federal	G.A.V. Rees
Health	O. Meresz
Conservation Authority	L. Vlassoff
Municipal	S. Villard
Other Government	G. Crawford
Miscellaneous	

2. Sulfation Plates

At several regional meetings the matter of sulfation rate analysis was discussed. The status of the work is:

	ACTION BY
i) The regions have all curtailed use of sulfation plates and candles.	
ii) Presently only 3 regions require sulfation rate analyses; Northwestern and Northeastern regions require the lion's share of the load (amounting to only about 60 per month).	B. Creighton A. Perras
iii) Northwestern Regional laboratory is investigating the possibility of providing MOE-wide analysis of exposed sulfation rate media.	

3. Laboratory turnaround times

J. Bishop

The matter of turnaround was an issue at most meetings. J. Bishop has been asked by G.C. Ronan to prepare a Laboratory Services Branch - wide turnaround accounting system. This will be based upon optimum production figures within each Laboratory Services Branch section, and J. Bishop will keep clients informed as to progress. In the meantime, problems that crop up due to poor turnaround should be brought to J. Bishop's attention as they arise.

4. Role of Pesticides and Organic Trace Contaminants Sections

ACTION BY

Due to the confusion amongst clients as to the capabilities and overlapping work areas of the OTC and the Pesticides Sections, O. Meresz and G.A.V. Rees were asked to prepare documentation to clarify this situation. The accompanying material (Appendices I and II) is attached for your comments.

Comments to
O. Meresz
G.A.V. Rees

5. Sampling Seminar

B. Foster
B. Neary

Each region indicated interest in a sampling seminar. B. Foster and B. Neary are currently arranging this, and will contact the regions shortly to set times and speakers.

6. Complaint and Priority Analysis

Memorandum was circulated to regions on August 20, 1980 outlining the protocol for priority samples. Overall coordination is between one (or two) regional staff (usually the Technical Support Manager) and the central laboratory coordinator, Dr. J. Pimenta. Priority and special samples appear to be processed in a suitable manner as a result of the improved communication between the regions and the laboratory, but if problems persist please notify J. Pimenta or J. Bishop.

NW - B. Creighton
NE - J. Fry
C - B. Singh
WC - R.C. Stewart
SE - S. MacBeth
SW - F. Durham
C. Schenk
J. Pimenta

7. Curtailing redundant programs

ACTION BY
J. Bishop

Staff from Southwestern and Northeastern regions suggested that certain programs aimed at determining specific aspects of water or air quality may have been initiated in the past, had samples taken, and had analyses performed, but were never turned off. J. Bishop agreed to check with originating branches (Pollution Contol, Water Resources, and Air Resources) to determine whether savings in laboratory resources could be made by halting further work in the redundant programs.

?

8. Fluoridation rate and dustfall analysis

J. Bishop
B. Foster

All regions agreed to re-examine their analytical requirements for these two parameters. To date, two regions have made further reductions. At present, these tests are performed in the Inorganic Trace Contaminants Section, and there are in-laboratory studies underway aimed at improving the scientific value of data from both groups. The fluoride samplers are being investigated as part of a Ministry of Health, Ministry of Labour and Ministry of the Environment project coordinated by a Federal task force, while dustfalls are being examined in terms of deployment and data usage. As progress is made in either area, the appropriate regional staff will be notified.

sampler!

9. Transfer of analytical functions

The Laboratory Services Branch is involved in the transfer of certain analytical functions to the Regional Laboratories. At present, the sulfation rate determination is under review, with Air Resources Branch, Laboratory Services Branch and Northwestern Region primarily involved (See item 2, this memo).

As other analytical function transfers are considered, they will be brought to the attention of each affected region.

10. In-Plant Testing

ACTION BY
S. Villard

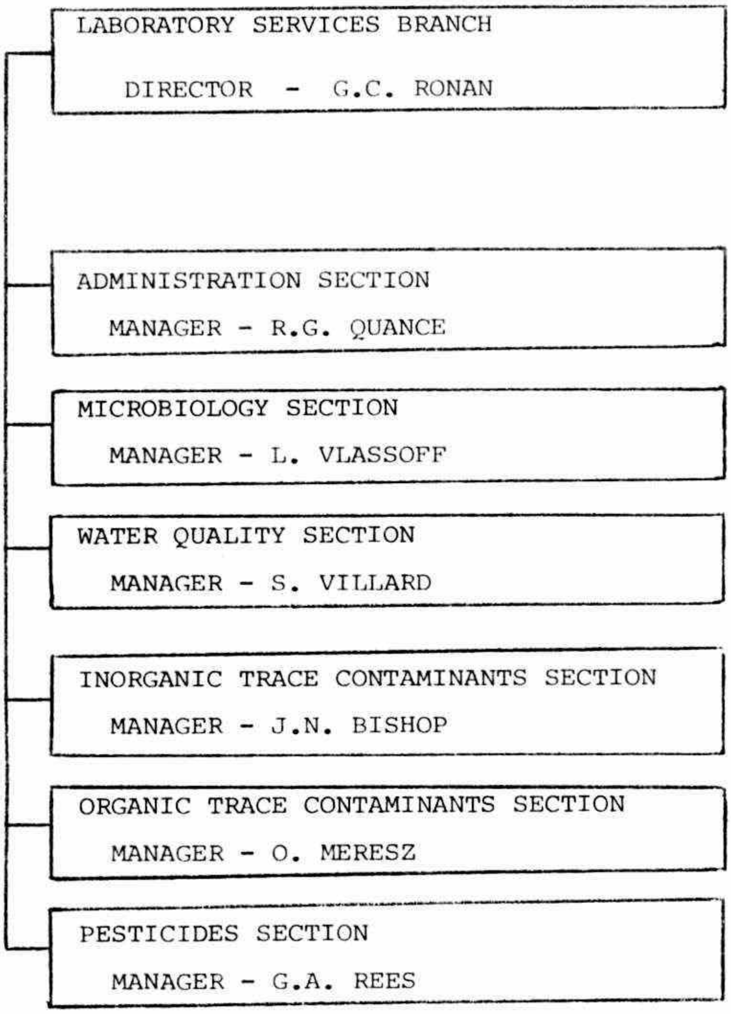
Analytical testing in treatment plants was suggested as a means for relieving some laboratory congestion, where adequate facilities are available . Total solids, volatile solids, turbidity, etcetera were considered typical of the parameters that could be handled in this fashion. S. Villard agreed to initiate a formalized plan to internally audit in-plant testing.

FUTURE ACTION

It is the intention to carry out semi-annual review of workload performance between clients and laboratory personnel. These reviews will be very useful in terms of problem solving, communication of new needs, assessing quality of past performance, and modifying programs to adjust to changing requirements.

APPENDIX ONE

ORGANIZATION CHART - LABORATORY SERVICES BRANCH



LABORATORY SERVICES BRANCH
DIRECTOR - G.C. RONAN

ADMINISTRATION SECTION
MANAGER - R.G. QUANCE

MICROBIOLOGY SECTION
MANAGER - L. VLASSOFF

WATER QUALITY SECTION
MANAGER - S. VILLARD

INORGANIC TRACE CONTAMINANTS SECTION
MANAGER - J.N. BISHOP

ORGANIC TRACE CONTAMINANTS SECTION
MANAGER - O. MERESZ

PESTICIDES SECTION
MANAGER - G.A. REES

APPENDIX TWO

FUNCTIONS OF THE LABORATORY SERVICES BRANCH SECTIONS

1 - LABORATORY SERVICES BRANCH

Provides analytical support for the operating programs of the Ministry, amounting to some 1.5 million analytical tests per year. Development of analytical methodology is provided, to extend the usefulness of analytical data provided to clients and to measure newly emerging pollutants. Scientists provide expertise in data interpretation and in planning and implementing environmental protection programs.

2 - ADMINISTRATION SECTION

The Administrative Section is responsible for three main functions within the Branch. They are personnel, finance and general administration; Laboratory and Research Complex safety program; and the Central Stores for the Ministry.

The Central Stores area is the main supply centre for the Ministry. It maintains a $325,000 inventory of chemicals, glassware and sample containers.

3 - MICROBIOLOGY SECTION

The Microbiology Section provides microbiological analyses and expertise on matters related to health, ecology, the environmental and treatment process systems, and develops, implements, interprets and reports on studies related to these programs.

It also develops studies related to improving microbiological expertise in each of this section's activities, which are:

/....2

a. Water Quality:

Provides for the analysis of municipal raw and drinking water samples using sensitive analytical techniques. Municipalities are immediately informed of unsatisfactory sample results to allow them to take quick remedial action.

b. Rivers and Wastes:

Provides for the analyses of river and stream monitoring samples and the analysis of sewage and other liquid and solid waste discharges. Samples are analyzed for regulatory and assessment purposes using the latest standard methods. Interpretations and summary reports are prepared.

c. Developmental Work:

Includes the service laboratories of media, taxonomy and quality control. Developmental work is performed for the analysis of environmental samples for mutagens, potential carcinogens and viruses. Effects of acid rain on microbial environmental processes will be investigated in 1980-81.

4 - WATER QUALITY SECTION

The Water Quality Section's main tasks are:

- To provide analytical support for all branches submitting samples involving water quality in Ontario;
- To develop and provide specialized analytical methods for a variety of sample types including processed and domestic waters, groundwater and leachates, routine river monitoring samples, sewage treatment plant samples, lake waters, and industrial waste samples;

- To develop and provide specialized low-level methods capable of providing accurate and precise analytical results for snow melts, precipitation and other trace level sources;
- To provide technical guidance and coordinate with branches and sections of the Ministry by providing expertise on water quality related matters to assist the data user in the interpretation of analytical results including correlation of chemical parameters.

The Section is comprised of the following units, whose activities are explained:

i Rivers and Lakes Laboratory:

The Rivers and Lakes Laboratory provides analytical support for stream and lake studies. The laboratory is capable of analyzing for approximately 35 parameters.

The Rivers and Lakes Laboratory measures various changes including those which affect river and lake quality, to trophic status of lakes and the assimilative capacity of streams.

ii Sewage and Industrial Waste Laboratory:

The Sewage and Industrial Waste Laboratory is geared to the analysis of samples from sewage treatment and industrial plants.

The Sewage Carbon Analysis and Nutrient Units conduct analyses to measure the efficiency and some of the gross pollutants of industrial operations.

These laboratories are also assessing better ways of measuring assimilative capacity and newer methods for the measurement of ammonia in sludge.

/....4

iii Water and Precipitation Laboratory:

The Domestic Water Unit provides measurements of gross mineral and physical parameters relating to the aesthetic, health and chemical acceptability of waters for domestic use. Raw and treated ground and surface waters from water treatment plants and distribution systems constitute the major workload. Other sources include private wells or surface supplies and landfill site leachates collected under Ministry sponsorship.

iv Electron Microscopy and Liquid Scintillation Laboratory:

As a result of reorganization the electron microscopy and liquid scintillation work of the former Physical Methods Section has been transferred to the Water Quality Section. Samples of particulate material from ambient air and of both raw and treated water from water supplies are submitted for asbestos analysis. Chrysotile and amphibole asbestos fibres are counted and sized in by a transmission electron microscope and identified in the microscopy by their appearance and by their selected area electron diffraction patterns.

A scanning electro~~l~~n microscope, equipped with an energy-dispersive X-ray system, is used to determine the elemental composition of dust and sediment particles and to examine injured areas in vegetation affected by pollutants. Liquid scintillation equipment is used to support lake primary productivity, biologically active phosphorus measurements and measure the age of groundwaters. ?

5 - INORGANIC TRACE CONTAMINANTS SECTION

The Inorganic Trace Contaminants Section (ITC) performs metals, anions, and specialty testing on a wide range of environmental sample materials. Air filters, surface waters, and sediments are analyzed for a large number of metals and toxic anions. Human tissues collected by other agencies, as well as vegetation, landfill material, soil, air particulate matter, drinking water and industrial effluent materials are also analyzed, for a wide variety of hazardous materials by the ITC Section.

The ITC Section is comprised of the following groups:

i The Sediment Laboratory:

Applies the latest analytical techniques to the analysis of landfill materials, sediments, soils, sewage sludge, and plants. Chemical and physical tests are carried out by Emission Spectroscopy, Atomic Absorption Spectro~~scopy~~ photometry, and a host of other analytical techniques. Mercury, lead, cadmium, and arsenic are among the metals determined ~~on~~ in these samples.

which?

what!

Specialized studies such as leach tests on landfill material are carried out. About 30,000 tests are done annually in this area.

ii The Effluent Laboratory:

Provides heavy metal and anions analysis. About 40 elements are routinely tested ~~on~~ in drinking water, lakes and rivers, industrial effluents, and miscellaneous liquid samples. Many mercury, lead, cadmium, cyanide, and arsenic tests are done.

Among the parameters determined in this unit are: Hg, Pb....

Special tests are developed as needed (automated testing using Emission Spectroscopy was added in 1978-79, and extensive method development is necessary. About 110,000 tests are completed annually in this laboratory.

not automated!

/....6

(see Sediment lab on previous page: also soil & vegn

iii **Soil and Vegetation Laboratory:**

This unit prepares and analyses vegetation and soil for a wide variety of airborne contaminants. Vegetation is analyzed because it can be damaged by fallout and because it acts as a natural collection material for some pollutants.

Heavy metals and anions are most frequently determined especially mercury, cadmium, lead and fluoride. About 40,000 tests are completed yearly.

iv **Air Quality Laboratory:**

This unit prepares and analyses various types of air filters for many inorganic parameters. Hi-Vol filters and dustfall jars constitute the main collection means for rapid estimates of most metals and anions in air, while specific passive collectors are used for some parameters. Fluorine (Fluoride), sulfur oxides, arsenic and other toxic materials are analysed in this area.

?these are gases!

Considerable development work is required for specialty sampling, for example, acid rainfall collection, preservation and analysis, the dichotomous filter study, and for the Federal/Provincial fluoride study.

projects?

In 1979-80, Inductively Coupled Argon – Plasma Emission Spectroscopy was added to the techniques used to determine metals in particulate matter. About 90,000 tests are determined annually in this unit.

/....7

α

v Special Projects Group:

This group spearheads non-routine investigations requiring inorganic chemical expertise in a wide range of environmental areas, including air, water, soil, sediment, fish biological and human tissue, vegetation and sewage. Principal activities are development of methods for new parameters, (Inductively Coupled Plasma metods for metals in waters and Hi-Vols were added for 1978-79) ! and automation and interfacing analysis with computers to improve turnaround time and data management.

interface analysis? with what?

vi Emission Spectroscopy Laboratory:

Analyses a wide range of liquid and solid samples for a large number of metals. The capabilities of simultaneous multi-element analysis, total metal analysis without prior dissolution and analysis of trace concentrations using the ICP, complement the analytical methods used by other laboratories in the section. Fifty metals, from antimony to zirconium, are can be determined. ~~in this fashion.~~ About 30,000 tests were completed during 1979-80 in this area.

vii Particulate Analysis Unit: where is this unit? Name its Supvr.

This unit provides an analytical service to the various regions by assisting them in their investigation of complaints through a combination of on-site observations and Laboratory technical analysis. A diversity of non-routine type samples are examined with the objective of pin-pointing emission sources.

~~Particulate Analysis Unit (con'd)~~

Rapid determination of lead and carbon in air particulate matters, sulphur and metals in vegetation, and sulphate in air samples are also carried out.

Instrumentation used for these purposes includes optical microscopes, X-ray and Atomic Absorption spectro~~meters~~photometers.

Newly added specialty tests include heavy metal content of vegetation by XRF and various special tests of boron and major elements in difficult to analyse materials.

6 - ORGANIC TRACE CONTAMINANTS

The objectives of the Organic Trace Contaminants Section (OTC) are:

i. To provide analytical support in the field of organic pollutants for other branches of the Ministry. ~~in their pollution control programs~~

ii To provide expertise covering ~~the~~ a broad field of organic chemistry and environmental trace analysis related to air, water, soil, sediment, wildlife and special samples;

iii To update analytical procedures and develop new methods for measuring existing and new organic environmental contaminants;

To suggest and carry out studies and investigative work on the behaviour and effects of organic pollutants in the environment.

The OTC Section is comprised of the following units:

i Spectroscopy:

Carries out isolation of problem organics and their characterization by one or more spectroscopic methods (infrared, ultra-violet, fluorescence or Nuclear Magnetic Resonance). Oil and gasoline spill characterization and source identification typify the problems investigated.

/....9

ii Chromatography:

Carries out separation and quantitation of organic Contaminants ~~compounds~~ using gas and liquid chromatographic techniques, together with the corresponding method development work.

iii Mass Spectrometry:

Provides positive identification of organic compounds including pollutants even when they are present as components of complex mixtures and at or below the ppb levels. The scientists-Gas Chromatograph-Mass Spectrometer-computer combination is the most powerful tool in environmental trace analysis and can produce in hours or days, answers to problems which a few years ago would have taken several months or more of scientist-time to solve. Activities during 1979-80 included the acquisition and installation of a new mass spectrometer-data system capable of carrying out automated sample processing.

7 - PESTICIDES SECTION:

The Pesticides Section performs specific routine organic tests and non-routine analyses related to field work covering all types of environmental samples. The Section is made up of the following units:

i Non-Polar Contaminants Unit:

Provides scientific expertise and an analytical monitoring capability for the identification and measurement of persistent non-polar pesticides and other similar contaminants in all types of environmental samples.

/....10

ii Polar Contaminants Unit:

This unit provides scientific expertise and analytical monitoring capability for the identification and measurement of a wide range of chemically different types of herbicides and other polar materials, such as chlorophenols and polar pesticides.

Due to the very wide range of chemical types and environmental behaviour in this large group of chemicals their analysis requires a more " custom made" approach, each sub-group requiring different preparative procedures, instrumental analysis and selective detection systems.

iii Research and Development Unit:

This unit initiates research and development in the field of evaluating new pesticidal or industrial organic pollutants, assesses their potential as a health hazard to humans and/or wildlife, and conducts in-laboratory and field studies into the environmental behaviour of such new pollutants.

It also responds to queries on the environmental impact of new organic pollutants. related to pesticides.

iv Advanced Instrumentation (Dioxin Laboratory):

This group develops, implements and provides specialized analytical services in areas where highly specialized instrumentation and expertise is required. The unit is responsible for developing and applying techniques ~~in~~ using computerized capillary Column gas chromatography/mass spectrometry ~~capillary column gas chromatography~~ and fields of special design high sensitivity chromatographic detection systems. for the detn of dioxins.

Advanced Instrumentation (Dioxin Laboratory) - con'd.

The unit provides diagnostic support for investigations into complex mixtures of persistent pollutants, including highly toxic materials such as chlorodibenzafurans, chlorodioxins, dechloranes and PBB's.

ORGANIC ANALYSES

CARRIED OUT

By the

Organic Trace Contaminants
Section

Contents:

① OTC capabilities & det. limit
② Pest. Sec. Capabilities

Not included

i metals-anions. ITC Capabilities & det. Lt.
ii Water Quality
iii Microbiology

OTC SECTION

Test Group	Number of Tests Routine	Special	Contact
Alcohols			
- monoalcohols	10		E. G. Adamek
- dialcohols	3		"
Nitro-organics			
- musks	-	5	E. G. Adamek
- amines	8		"
- nitrosamines	5		"
- nitroaromatics	2		"
Acids			
- diacids	11		E. G. Adamek
- resin, fatty and aromatic	22		"
- volatile fatty	9		"
Organosulphur			
- volatile organosulphur	9		E. G. Adamek
Organohalide			
- volatile organohalide	6		E. G. Adamek
Hydrocarbons			
- gases	14		E. G. Adamek
- chlorinated, aliphatic and aromatic	25		"
- petroleum hydrocarbons	3		G. Wyhovszky
- polynuclear aromatic hydrocarbons	6		E. G. Adamek
	-	12	R. D. Smillie
Phenols			
- Gibbs method	1		G. Wyhovszky
- by HPLC		10	R. D. Smillie
Solvent extractables			
	1		G. Wyhovszky
Tannins			
	1		G. Wyhovszky
Tracer dyes	3		G. Wyhovszky
Identifications			
- grease and oil	-		G. Wyhovszky
- misc.			
Mass Spectrometry			
- purgeables			R. F. Bonner
- extractables	Scan.		"

OTC Section

The type of matrices have been simplified to solids and liquids. The exception to these types are noted under the matrix heading for a given test group.

Solids - includes sand, soil, sediment, sludge, solids, vegetation and biota.

Liquids - includes rivers, lakes, ground water, drinking water, industrial effluents and liquid wastes.

OTC Section

Group: Alcohols
- monoalcohols

Matrix	Method	Units of Measure
1. Liquid	Direct injection; GC/FID	mg/ℓ

Test	Detection Limit mg/ℓ	Standard deviation near detection limit.
1. Methanol	1.0	
2. Ethanol	1.0	
3. 2-Propanol	1.0	
4. 1-Propanol	1.0	
5. Isobutanol	1.0	
6. Butanol	1.0	
7. 3-Pentanol	1.0	
8. Isopentanol	1.0	
9. 1-Pentanol	1.0	
10. Cyclohexanol	1.0	

Contact: E. G. Adamek

Std. dev^{n} is required to qualify the data
(to establish the confidence level 1, 2, 3 .. x std. dev.).

OTC Section

Group: Alcohols
- dialcohols

Matrix	Method	Units of Measure
1. Liquid	distillation; GC/FID	mg/l

Test	Detection Limit mg/l	S. dev.
1. Ethylene glycol	0.5	
2. Diethylene glycol	0.5	
3. Propylene glycol	0.5	

Contact: E. G. Adamek

OTC Section

Group: Nitro-organics
- musks

Matrix	Method	Units of Measure
1. Gasoline*	direct injection; GC/AFID	mg/ℓ
2. Fuel oil*	direct injection; GC/AFID	mg/ℓ

Test

	Detection Limit mg/ℓ Matrix 1	s.dev	Matrix 2	s.d.
1. Musk xylol	0.1		1.0	
2. Musk ambrette	0.1		1.0	
3. Musk ketone	0.1		1.0	
4. Musk tibetene	0.1		1.0	
5. Moskene	0.1		1.0	

* Special request

Contact: E. G. Adamek

8.

OTC Section

Group: Nitro-organics
- amines

Matrix	Method	Units of Measure
1. Liquid	Direct injection; GC/AFID	mg/L

Test	Detection Limit mg/l	s.d.
1. Methylamine	0.1	
2. Dimethylamine	0.1	
3. Trimethylamine	0.1	
4. Ethylamine	0.1	
5. Aniline	0.1	
6. Diphenylamine	0.1	
7. Morpholine	0.1	
8. Cyclohexylamine	0.1	

Contact: E. G. Adamek

OTC Section

Group: Nitro-organics
- amines

Matrix	Method	Units of Measure
1. Liquid	Direct injection; GC/AFID	mg/L

Test	Detection Limit mg/l
1. Methylamine	0.1
2. Dimethylamine	0.1
3. Trimethylamine	0.1
4. Ethylamine	0.1
5. Aniline	0.1
6. Diphenylamine	0.1
7. Morpholine	0.1
8. Cyclohexylamine	0.1

Contact: E. G. Adamek

OTC Section

Group: Nitro-organics
- nitrosamines

Matrix	Method	~~Units of Measure~~
1. Liquid	Direct injection; GC/AFID	~~mg/L~~

Test	Detection Limit mg/l	s.d.
1. Dimethyl-N-nitrosamine	0.1	
2. Diethyl-N-nitrosamine	0.1	
3. Diphenyl-N-nitrosamine	0.1	
4. Nitrosomorpholine	0.1	
5. Nitrosocyclohexylamine	0.1	

Contact: E. G. Adamek

OTC Section

Group: Nitro-organics
- nitroaromatics

Matrix	Method	Units of Measure
1. Liquid	extraction; GC/AFID	ug/L

Test	Detection Limit μg/l
1. 2,4-Dinitrotoluene	0.5
2. 3,4-Dinitrotoluene	0.5

Contact: E. G. Adamek

OTC Section

Group: Acids
- diacids

Matrix	Method	Units of Measure
1. Liquid	extract/esterify; GC/FID	ug/L

Test	Detection Limit μg/l
1. Oxalic Acid	1.0
2. Malonic Acid	1.0
3. Succinic Acid	1.0
4. Maleic Acid	1.0
5. Fumaric Acid	1.0
6. Glutaric Acid	1.0
7. Adipic Acid	1.0
8. Pimelic Acid	1.0
9. Octanedioic Acid	1.0
10. Nonanedioic Acid	1.0
11. Decanedioic Acid	1.0

Contact: E. G. Adamek

OTC Section

Group: Acids
- resin, fatty and aromatic

Matrix	Method	Units of Measure
1. Liquid	extract/esterify; GC/FID	mg/L

Test	Detection Limit mg/l	s.d
1. Capric Acid	0.02	
2. Benzoic Acid	0.02	
3. Lauric Acid	0.02	
4. Salicylic Acid	0.02	
5. Myristic Acid	0.02	
6. Palmitic Acid	0.02	
7. Cinnamic Acid	0.02	
8. Stearic Acid	0.02	
9. Oleic Acid	0.02	
10. Linoleic Acid	0.02	
11. Linolenic Acid	0.02	
12. Arachidic Acid	0.02	
13. Phthalic Acid	0.02	
14. Syringic Acid	0.02	
15. Pimaric Acid	0.05	
16. Sandaracopimaric Acid	0.05	
17. Palustric Acid	0.05	
18. Levopimaric Acid	0.05	
19. Isopimaric Acid	0.05	
20. Neoabietic Acid	0.05	
21. Abietic Acid	0.05	
22. Dehydroabietic Acid	0.05	

Contact: E. G. Adamek

OTC Section

Group: Acids
- volatile fatty

Matrix	Method	Units of Measure
1. Liquid	Direct injection; GC/FID	mg/L

Test	Detection Limit mg/l	spl.
1. Formic Acid	10	
2. Acetic Acid	0.1	
3. Propanoic Acid	0.1	
4. Butanoic Acid	0.1	
5. Pentanoic Acid	0.1	
6. Hexanoic Acid	0.1	
7. Heptanoic Acid	0.1	
8. Octanoic Acid	0.1	
9. Nonanoic Acid	0.1	

Contact: E. G. Adamek

OTC Section

Group: Organosulphur
- volatile organosulphur

Matrix	Method	Units of Measure
1. Liquid	Headspace; GC/FPD	mg/L
2. Solid	Headspace; GC/FPD	ug/g
3. Air	Direct injection; GC/FPD	mg/m^3

Test

	Detection Limit		
	Matrix 1 mg/l	Matrix 2 µg/g	Matrix 3 mg/m^3
1. Carbonyl sulphide	1.0	5.0	0.5
2. Hydrogen sulphide	1.0	5.0	0.5
3. Methyl mercaptan	1.0	5.0	0.5
4. Carbon disulphide	1.0	5.0	0.5
5. Sulphur dioxide	1.0	5.0	0.5
6. Dimethyl sulphide	1.0	5.0	0.5
7. Ethyl mercaptan	1.0	5.0	0.5
8. Thiophene	1.0	5.0	0.5
9. Dimethyl disulphide	1.0	5.0	0.5

Contact: E. G. Adamek

OTC Section

Group: Organohalides
- Volatile organohalides

Matrix	Method	Units of Measure
1. Drinking water	Direct injection; GC/ECD	ug/L

Test	Detection Limit
1. Chloroform	1.0
2. Carbon tetrachloride	0.1
3. Trichloroethylene	0.5
4. Bromodichloromethane	0.5
5. Tetrachloroethylene	0.5
6. Chlorodibromomethane	0.5

Contact: E. G. Adamek

OTC Section

Group: Hydrocarbons
- gases

Matrix	Method	Units of Measure
1. Liquid	Headspace; GC/FID	ug/L
2. Solid	Headspace; GC/FID	ug/g
3. Air (bag)	Direct injection; GC/FID	ug/m^3
4. Air (Charcoal trap)	CS_2 elution; GC/FID	ug/m^3

Test

	Detection Limit			
	Matrix 1	Matrix 2	Matrix 3	Matrix 4
1. Methane	10	1.0	10	10
2. Ethylene	10	1.0	10	10
3. Ethane	10	1.0	10	10
4. Acetylene	10	1.0	10	10
5. Propane	10	1.0	10	10
6. Cyclopropane	10	1.0	10	10
7. Methyl chloride	10	1.0	10	10
8. Vinyl chloride	10	1.0	10	10
9. 1-Butene	10	1.0	10	10
10. Butane	10	1.0	10	10
11. Pentane	10	1.0	10	10
12. Dichloromethane	10	1.0	10	10
13. Hexane	10	1.0	10	10
14. Cyclohexane	10	1.0	10	10

Contact: E. G. Adamek

OTC Section

Group: Hydrocarbons
- Petroleum hydrocarbons

Matrix	Method	Units of Measure
1. Liquid	extraction; GC/FID	ug/L
2. Solid	extraction; GC/FID	ug/g

Test	Detection Limit Matrix 1	 Matrix 2
1. Gasoline	10	1.0
2. Industrial solvent	10	1.0
3. Medium boiling dist. fraction	10	1.0

Contact: G. Wyhovszky

OTC Section

Group: Hydrocarbons
- polynuclear aromatic hydrocarbons

Matrix	Method	Units of Measure
1. Air (HiVol filter)	extraction; HPLC/FL	mg/m^3
2. Liquid*	extraction; HPLC/FL	ng/L
3. Solid*	extraction; HPLC/FL	ng/g

Test

	Detection Limit		
	Matrix 1	Matrix 2	Matrix 3
1. Benz(a)pyrene	.05	0.1	1.0
2. Benzo(k)fluoranthene	.05	0.1	1.0
3. Fluoranthene	.05	0.1	1.0
4. Perylene	.05	0.1	1.0
5. Benzo(g,h,i)perylene	.05	0.1	1.0
6. Indeno(1,2,3,cd)pyrene	.05	0.1	1.0
7. Fluorene*	.05	0.1	1.0
8. Benz(a)anthracene*	.05	0.1	1.0
9. Chrysene*	.05	0.1	1.0
10. Dibenz(a,h)anthracene*	.05	0.1	1.0
11. Anthanthrene*	.05	0.1	1.0
12. Coronene*	.05	0.1	1.0

* These tests are non-routine and may be requested from R. D. Smillie

Contact: E. G. Adamek

OTC Section

Group: Phenols

Matrix	Method	Units of Measure
1. a Liquid	Gibbs colour	mg/L
b*	extraction; HPLC/UV	ug/L
2. a Solid	leach; Gibbs colour	mg/g
b*	extraction; HPLC/UV	ug/g

Test

	Detection Limit			
	Matrix 1a	Matrix 1b	Matrix 2a	Matrix 2b
1. Phenol	1.0	0.3	1.0	1.0
2. o-Chlorophenol*	-	0.5	-	1.0
3. p-Chlorophenol*	-	0.5	-	1.0
4. 3-Chloro,4-methylphenol*	-	0.5	-	1.0
5. 2,5-Dimethylphenol*	-	0.5	-	1.0
6. 2,4-Dichlorophenol*	-	0.5	-	1.0
7. 2,4,6-Trichlorophenol*	-	0.5	-	1.0
8. 2,4,5-Trichlorophenol*	-	0.5	-	1.0
9. Pentachlorophenol*	-	0.5	-	1.0

* These tests are non-routine and may be requested from R. D. Smillie

Contact: G. Wyhovszky

OTC Section

Group: Solvent extractables

Matrix	Method	Units of Measure
1. Liquid	extract; weight	mg/L
2. Solid	extract; weight	ug/g

Test

	Detection Limit	
	Matrix 1	Matrix 2
1. Solvent extractable	1.0	1.0

Contact: G. Wyhovszky

OTC Section

Group: Tannin

Matrix	Method	Units of Measure
1. Liquid	colour method	mg/L
2. Solid	leach; colour method	ug/g

Test

	Detection Limit	
	Matrix 1	Matrix 2
1. Tannin	1.0	1.0

Contact: G. Wyhovszky

OTC Section

Group: Tracer dyes Identification

Matrix	Method	Units of Measure
1. Liquid	Fluorescence detection	/ -

Test

1. pH
2. Rhodamine dye
3. Sodium fluoroscein

Contact: G. Wyhovszky

OTC Section

Group: Identification

Matrix	Method	Units of Measure
1. Liquid	extraction	-
2. Solid	extraction	-

Test

1. Physical appearance
2. Solvent extraction
3. Column separation
4. Thin layer chromatography
5. Infrared determination
6. Ultraviolet determination
7. Fluorescence determination
8. Gas chromatographic determination
9. Microscopic determination

Contact: G. Wyhovszky

OTC Section

Group: Mass Spectrometric Identification

Matrix	Method	Units of Measure
1. Liquid	- ?	-
2. Solid	-	-

Test

Identification by gas chromatography/mass spectrometry

Contact: R. F. Bonner

OTC Section

Group: Hydrocarbons
- chlorinated, aliphatic and aromatic

Matrix	Method	Units of Measure
1. Liquid	Headspace; GC/FI & ECD	ug/L
2. Solid	Headspace; GC/FI & ECD	ug/g
3. Air (bag)	Direct injection; GC/FI & ECD	ug/m^3
4. Air (Tenax trap)	Thermal desorption; GC/FI & ECD	ug/m^3
5. Air (Charcoal trap)	CS_2 elution; GC/FI & ECD	ug/m^3

Test

	Detection Limits				
	Matrix 1	Matrix 2	Matrix 3	Matrix 4	Matrix 5
1. Pentane	1.0	1.0	10	0.1	1.0
2. Diethylether	1.0	1.0	10	0.1	1.0
3. Hexane	1.0	1.0	10	0.1	1.0
4. Heptane	1.0	1.0	10	0.1	1.0
5. Benzene	1.0	1.0	10	0.1	1.0
6. Octane	1.0	1.0	10	0.1	1.0
7. Toluene	1.0	1.0	10	0.1	1.0
8. Nonane	1.0	1.0	10	0.1	1.0
9. Ethylbenzene	1.0	1.0	10	0.1	1.0
10. p-Xylene	1.0	1.0	10	0.1	1.0
11. m-Xylene	1.0	1.0	10	0.1	1.0
12. o-Xylene	1.0	1.0	10	0.1	1.0
13. Cumene	1.0	1.0	10	0.1	1.0
14. Styrene	1.0	1.0	10	0.1	1.0
15. Decane	1.0	1.0	10	0.1	1.0
16. Propylbenzene	1.0	1.0	10	0.1	1.0
17. o-Chlorotoluene	1.0	1.0	10	0.1	1.0
18. Mesitylene	1.0	1.0	10	0.1	1.0
19. p-Cymene	1.0	1.0	10	0.1	1.0
20. m-Dichlorobenzene	1.0	1.0	10	0.1	1.0
21. Dichloromethane	0.1	0.1	1.0	.01	0.1
22. Carbon tetrachloride	0.1	0.1	1.0	.01	0.1
23. Chloroform	0.1	0.1	1.0	.01	0.1
24. Trichloroethylene	0.1	0.1	1.0	.01	0.1
25. Tetrachloroethylene	0.1	0.1	1.0	.01	0.1

Contact: E. G. Adamek

ONTARIO MINISTRY OF ENVIRONMENT

PESTICIDES SECTION

ANALYTICAL CAPABILITIES - DECEMBER 1980

NOTE

Throughout this document the Matrix headings refer to the following sample types unless otherwise indicated.

1) Waters including Rivers, Lakes, Well Water, drinking water, industrial effluents, precipitation.

2) Sediments including sands, soils, sediment, sludges, compost, paper, solids

3) Vegetation including aquatic and terrestrial plants, vegetables, fruit, plankton

4) Biota including shellfish, crustaceans, fishes.

Those matricies indicated in brackets on the individual sheets have not been analysed on a routine basis but could be analysed after suitable methods are developed.

PESTICIDES SECTION

	No. of Tests		Contact Person
Analysis Group	Routine	Special	
INSECTICIDES			
Organochlorines	18	4	G.Crawford
Organophosphorous	10	3	J.Osborne/P.Baulu
Carbanates (N-methyl)	6	-	J.Osborne
Pyrethrins	* -	4	G.Crawford
Rotenone	*	1	J.Osborne
HERBICIDES			
Ureas	3	10	J.Osborne
Triazines	9	-	"
Phenoxy Acids	6	4	"
Carbamates (N-phenyl)	8	-	"
Halogenated Anilines	5	6	"
Paraquat/Diquat	* -	2	"
DNOC/Dinoseb	* -	2	"
INDUSTRIAL ORGANICS			
PCB's	1	-	J.Osborne/G.Crawford
PBB's	1	-	"
Dechloranes	4	-	"
Halowaxes	4	-	"
Biphenyl	1	-	J.Osborne
Aryl phosphates	-	30	"
Chlorophenols	4	10	"
Dioxins/Furans	22 (Dioxins only)		H.Tosine
Chlorobenzenes	6	8	J.Osoborne
Phthalates	8	-	J.Osborne/P.Baulu
Chlorostyrenes	* 1	-	J.Osborne
Chloroxylenes	* -	-	"
Chlorotoluenes	* -	-	"
Chlorodienes			

* NO BREAKDOWN - analysis in developmental stages
no complete parameter listing
detection limits unknown at present

Ministry of the Environment - Pesticides Section

~~Analysis~~ Analytical Parameters

Scan Group Organochlorine & PCB (OC/PCB) **Class** Insecticide

Matrix		Sensitivity Group	Units
1)	Waters	1	ug/l
2)	Sediments	1	ug/gm
3)	Vegetation	1	"
4)	Biota	1	"
5)	Fish*	1	"
6)			
7)			
8)			

Parameters Routine		Sensitivity Group 1	2	S.d.
1)	Hexachlorobenzene	0.001		/
2)	Heptachlor	0.001		/
3)	Aldrin	0.001		/
4)	ppDDE	0.001		/
5)	Mirex	0.005		
6)	αBHC	0.001		
7)	γBHC (Lindane)	0.001		
8)	βBHC	0.001		
9)	αChlordane	0.001		
10)	γChlordane	0.001		
11)	opDDT	0.005		
12)	ppDDD	0.005		
13)	ppDDT	0.005		
14)	Heptachlor Epoxide	0.001*		
15)	Dieldrin	0.001*		
16)	Endrin	0.001*		
17)	Endosulphan I	0.001*		
18)	Endosulphan II	0.001*		
19)	PCB	0.020		

Parameters Special Request		Sensitivity Group 1	2
1)	Methoxychlor	0.005	
2)	Endosulphan Sulphate	0.005	
3)	Toxaphene	0.030	
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			
12)			
13)			
14)			
15)			
16)			
17)			
18)			
19)			

Contact Person George Crawford

*These parameters must be specifically requested on fish.

Ministry of the Environment - Pesticides Section
Analy~~sis~~tical Parameters

Scan Group Organophosphorous **Class** Insecticide

Matrix	Sensitivity Group	Units
1) Waters	1	ug/l
2) Vegetation	2	ug/gm
3) Sediment	2	ug/gm
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	2
1) Dichlorovos	0.01	0.001
2) Phorate	0.01	0.001
3) Diazinon	0.01	0.001
4) Parathion	0.01	0.001
5) Methyl Parathion	0.01	0.001
6) Malathion	0.01	0.001
7) Ethion	0.01	0.001
8) Methyl Trithion	0.10	0.01
9) Dursban	0.01	0.001
10) Reldan	0.01	0.001
11)		
12)		
13)		
14)		
15)		
16)		
17)		
18)		
19)		

Parameters Special Request	Sensitivity Group 1	2
1) Mevinphos	0.01	0.001
2) Guthion	0.10	0.10
3) Ronnel	0.01	0.001
4)		
5)		
6)		
7)		
8)		
9)		
10)		
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Contact Person Joe Osborne
Pat Baulu

Ministry of the Environment - Pesticides Section
Analy~~sis~~tical Parameters

Scan Group Carbamates (N-methyl) **Class** Insecticide

Matrix	Sensitivity Group	Units
1) Waters	1	ug/l
2)		
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	Sensitivity Group 2	Parameters Special Request	Sensitivity Group 1	Sensitivity Group 2
1) Carbofuran	0.10		1)		
2) OH-Carbofuran	0.10		2)		
3)			3)		
4)			4)		
5) Propoxur	0.20		5)		
6)			6)		
7)			7)		
8) Aminocarb	0.20		8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13) Bux	0.40		13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person Pat Baulu
Joe Osborne

Ministry of the Environment - Pesticides Section
Analy~~sis~~tical Parameters

Scan Group Pyrethrins **Class** Insecticide

Matrix	Sensitivity Group	Units
1) Water	1	ug/l
2)		
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	Sensitivity Group 2	Parameters Special Request	Sensitivity Group 1	Sensitivity Group 2
1)			1) Pyrethrin I	*	
2)			2) " II		
3)			3) Cinerin I	*	
4)			4) " II		
5)			5)		
6)			6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

* No detection limits available at this time.

Contact Person George Crawford

Ministry of the Environment - Pesticides Section
Analy~~sis~~tical Parameters

Scan Group Ureas

Class Herbicide

Matrix	Sensitivity Group	Units
1) Water	1	ug/l
2) Sediment		ug/gm
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	2	Parameters Special Request	Sensitivity Group 1	2
1)			1)Linuron	0.100	
2)			2)Monuron	0.100	
3)			3)Diuron	0.100	
4)			4)Chlordoluron	?	
5)			5)Fluometuron	?	
6)			6)Monolinuron	?	
7)			7)Chlorbromuron	?	
8)			8)Metoxuron	?	
9)			9)Patoran	?	
10)			10)Metobromuron	?	
11)			11)Sideron	?	
12)			12)Difenoxuron	?	
13)			13)Neburon	?	
14)			14)		
15)					
16)					
17)					
18)					
19)					

Linuron, Diuron
Monuron only compounds
run to date (Oct.1980)
Other sensitivities estimated
0.100 - 0.400

Contact Person Joe Osborne

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group Triazines

Class Herbicide

Matrix	Sensitivity Group	Units
1) Waters	1	ug/l
2) Sediments	1	ug/gm
3) Vegetation	1	"
4) (Biota)	1	"
5) (Fish)	1	"
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	2	Parameters Special Request	Sensitivity Group 1	2
1) Atrazine	0.05		1)		
2) Simizine	0.05		2)		
3) Propazine	0.05		3)		
4) Bladex	0.10		4)		
5) Prometon	0.05		5)		
6) Ametryne	0.05		6)		
7) Prometryne	0.05		7)		
8) Sencor	0.10		8)		
9) Atratone	0.05		9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person Joe Osborne

Ministry of the Environment - Pesticides Section

Analy~~sis~~tical Parameters

Scan Group Phenoxy Acids

Class Herbicide

Matrix	Sensitivity Group	Units
1) Waters	1	ug/l
2) Sediments	1	ug/gm
3) Vegetation	1	"
4) (Biota)	1	"
5) (Fish)	1	"
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	Sensitivity Group 2	Parameters Special Request	Sensitivity Group 1	Sensitivity Group 2
1) 2,4D	0.05		1) MCPA	0.500	
2) 2,4DB	0.20		2) MCPP	0.500	
3) 2,4,5T	0.025		3) Dicamba	0.100	
4) 2,4DP	0.05		4) (OH-Dicamba)	?	
5) Silvex	0.025		5)		
6) Picloram	0.05		6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person Joe Osborne

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group Carbamates (N-phenyl) Class Herbicide

Matrix	Sensitivity Group	Units
1) Waters	1	ug/l
2)		
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group		Parameters Special Request	Sensitivity Group	
	1	2		1	2
1) Sutan	0.10		1)		
2) CIPC	0.10		2)		
3) IPC	0.20		3)		
4) Captan	0.40		4)		
5) Diallate	0.20		5)		
6) Barban	0.40		6)		
7) Benomyl	0.20		7)		
8) Eptam	0.20		8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person P. Baulu
J. Osborne

Ministry of the Environment - Pesticides Section
Analytical Parameters

Scan Group Halogenated Anilines **Class** Herbicide

Matrix	Sensitivity Group	Units
1) Waters	1	µg/l
2) (Sediment)	1	µg/l
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	Sensitivity Group 2	Parameters Special Request	Sensitivity Group 1	Sensitivity Group 2
1) Fluchloralin	0.100		1) Flurolin	?	
2) Triflurolin	0.100		2) Proflurolin	?	
3) N-Methyl chloroanaline	0.100		3) Penoxalin	?	
4)			4) Isopropalin	?	
5) 3- chloroanaline	0.100		5) Nitrolin	?	
6)			6) Oryzalin	?	
7) 4- chloroanaline	0.100		7)		
8)			8) methodology being developed detection limits should be approx. the same as Routine Parameters eg. fluchlorolin, triflurolin		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person Joe Osborne

Ministry of the Environment - Pesticides Section

~~Analysis~~ Parameters

Analytical

Scan Group PCB Isomers **CLASS** Industrial Organics

Matrix		Sensitivity Group	Units
1)	Ambient Air	1	*ug/m^3
2)	Stack Gas	1	"
3)			
4)			
5)			
6)			
7)			
8)			

	Parameters Routine	Sensitivity Group 1	2		Parameters Special Request	Sensitivity Group 1	2
1)	PCB Isomers**	0.01		1)			
2)	45 PCB isomers			2)			
3)	currently available			3)			
4)	Range: Mono-Hepta chloro Biphenyl.			4)			
5)				5)			
6)				6)			
7)	* Total value of all identified isomers			7)			
8)				8)			
9)	** current methodology and			9)			
10)	isomer availability limits			10)			
11)	identification to 45 isomers			11)			
12)	at present.			12)			
13)				13)			
14)				14)			
15)				15)			
16)				16)			
17)				17)			
18)				18)			
19)				19)			

Contact Person J.Osborne

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group PBB's

Class Industrial Organics

Matrix		Sensitivity Group	Units
1)	Water	1	ug/l
2)			
3)			
4)			
5)			
6)			
7)			
8)			

Parameters Routine		Sensitivity Group 1	2
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			
12)			
13)			
14)			
15)			
16)			
17)			
18)			
19)			

Parameters Special Request		Sensitivity Group 1	2
1)	PBB	0.03	
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			
12)			
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Contact Person George Crawford
Joe Osborne

Ministry of the Environment - Pesticides Section

Analysis Parameters

Scan Group Dechloranes Class Industrial Organics

Matrix	Sensitivity Group	Units
1) Water	1	ug/l
2) Sediment	1	ug/gm
3) (Vegetation)	1	"
4) Biota	1	"
5) Fish	1	"
6)		
7)		
8)		

Parameters Routine	Sensitivity Group		Parameters Special Request	Sensitivity Group	
	1	2		1	2
1)			1) Dechlorane Plus	0.005	
2)			2) " 603	"	
3)			3) " 602	"	
4)			4) " 604	"	
5)			5)		
6)			6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person Joe Osborne, George Crawford

Ministry of the Environment - Pesticides Section

Analysis Parameters

Scan Group Halowax **Class** Industrial Organics

Matrix	Sensitivity Group	Units
1) Water	1	ug/l
2) Sediment	1	ug/gm
3) (Vegetation)	1	"
4) Biota	1	"
5) Fish	1	"
6)		
7)		
8)		

Parameters Routine	Sensitivity Group		Parameters Special Request	Sensitivity Group	
	1	2		1	2
1)			1) Halowax 1014	0.05	
2)			2) 1051	"	
3)			3) 1099	"	
4)			4)		
5)			5)		
6)			6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person George Crawford, Joe Osborne

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group Biphenyl

Class INDUSTRIAL ORGANICS

Matrix	Sensitivity Group	Units
1) AIR	1	ng/m^3
2)		
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group		Parameters Special Request	Sensitivity Group	
	1	2		1	2
1) BIPHENYL	1.0		1)		
2)			2)		
3)			3)		
4)			4)		
5)			5)		
6)			6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person J. Osborne

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group ARYL PHOSPHATES　　Class INDUSTRIAL ORGANICS

Matrix	Sensitivity Group	Units
1)	?	
2)		To be developed ?
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group		Parameters Special Request	Sensitivity Group	
	1	2		1	2
1)			1) METHODS TO BE		
2)			2) DEVELOPED AS		
3)			3) REQUIRED		
4)			4) 30 STANDARDS AVAILABLE		
5)			5)		
6)			6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person J.Osborne

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group Chlorophenols

Class Industrial Organics

Matrix	Sensitivity Group	Units
1) Waters	1	ug/l
2) (Fish)	1	ug/gm
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	Sensitivity Group 2
1) 2,4,6 Cl phenol	0.05	
2) 2,4,5 Cl "	0.05	
3) 2,3,4 Cl "	0.05	
4) PCP	0.05	
5)		
6) Further analytical range to include di and tetra chlorophenols.		
7)		
8)		
9)		
10)		
11)		
12)		
13)		
14)		
15)		
16)		
17)		
18)		
19)		

Parameters Special Request	Sensitivity Group 1	Sensitivity Group 2
1)		
2)		
3)		
4)		
5)		
6)		
7)		
8)		
9)		
10)		
11)		
12)		
13)		
14)		
15)		
16)		
17)		
18)		
19)		

Contact Person Joe Osborne

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group Dioxins/Furans **Class** Industrial Organics

Matrix	Sensitivity Group	Units
1) Water **	1	*ug/l
2)		
3) (Fish)	2	ug/gm
4) (Sediment)	2	ug/gm
5) (Fly Ash)	2	"
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	Sensitivity Group 2	Std. dev.	Parameters Special Request	Sensitivity Group 1	Sensitivity Group 2
1) 2,3,7,8 Tetra-chloro dioxin	0.010	0.00001		1)		
2)				2)		
3) Current methodology includes				3)		
4) 22 Tetra chloro dioxins				4)		
5) Further analytical range				5)		
6) to include higher chlorinated				6)		
7) dioxins and furans				7)		
8)				8)		
9)				9)		
10)				10)		
11)				11)		
12) * totalled value for all				12)		
13) identified dioxins				13)		
14)				14)		
15)				15)		
16)				16)		
17)				17)		
18)				18)		
19)				19)		

Contact Person Helle Tosine

** "Water-white" samples only eg. drinking water, lake water

Ministry of the Environment - Pesticides Section

Analysis Parameters

Scan Group CHLOROBENZENES Class INDUSTRIAL ORGANICS

Matrix	Sensitivity Group	Units
1) WATER	1	ug/l
2)		
3) (FISH)	1	ug/gm
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	Sensitivity Group 2
1) 1,2,3 Tetrachloro-benzene	0.025	
2) 1,2,4 "	"	
3) 1,3,5 "	"	
4) 1,2,3,4 "	0.02	
5) 1,2,3,5 "	"	
6) 1,2,4,5 "	"	
7) Pentachlorobenzene	0.01	
8) Hexachlorobenzene	0.01	
9)		
10)		
11)		
12)		
13)		
14)		
15)		
16)		
17)		
18)		
19)		

Parameters Special Request	Sensitivity Group 1	Sensitivity Group 2
1)		
2)		
3)		
4)		
5)		
6)		
7)		
8)		
9)		
10)		
11)		
12)		
13)		
14)		
15)		
16)		
17)		
18)		
19)		

Contact Person J.Osborne

Ministry of the Environment - Pesticides Section

Analysis Parameters

Scan Group Phthalates

Class Industrial Organics

Matrix	Sensitivity Group	Units
1) Water	1	ug/l
2)		
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group		Parameters Special Request	Sensitivity Group	
	1	2		1	2
1) Dimethyl Phthalates	0.5		1)		
2) Diethyl "	0.5		2)		
3) Dipropyl "	0.5		3)		
4) Dibutyl "	0.5		4)		
5) Dioctyl "	0.5		5)		
6) Diethyl-hexyl "	0.5		6)		
7) Dinonyl "	0.5		7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person P. Baulu

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group Chlorostyrenes

Class Industrial Organics

Matrix	Sensitivity Group	Units
1) Water	1	ug/1
2)		
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	Sensitivity Group 2	Parameters Special Request	Sensitivity Group 1	Sensitivity Group 2
1)			1)		
2) octachlorostyrene	0.02		2)		
3)			3)		
4) Awaiting other isomers for method development			4)		
5) 6 standards available			5)		
6) Range "Mono-Dichloro Styrene"			6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person Joe Osborne

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group Chloroxylenes   Class Industrial Organics

Matrix	Sensitivity Group	Units
1)	1	
2)		
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group		Parameters Special Request	Sensitivity Group	
	1	2		1	2
1)			1)		
2) Awaiting isomers for method			2)		
3) development			3)		
4) 14 standards available			4)		
5) Range: Mono-Hexa Chloroxylene			5)		
6)			6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person Joe Osborne

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group Chlorotoluenes **Class** Industrial Organics

Matrix	Sensitivity Group	Units
1) Water	1	
2)		
3)		
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group		Parameters Special Request	Sensitivity Group	
	1	2		1	2
1) Awaiting isomers for method			1)		
2) development			2)		
3) 17 isomers available			3)		
4) Range: Mono-Penta Chlorotoluenes			4)		
5)			5)		
6)			6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person Joe Osborne

Ministry of the Environment - Pesticides Section
Analysis Parameters

Scan Group CHLORODIENES Class INDUSTRIAL ORGANICS

Matrix	Sensitivity Group	Units
1) WATER	1	ug/l
2)		
3) (FISH)	1	ug/gm
4)		
5)		
6)		
7)		
8)		

Parameters Routine	Sensitivity Group 1	Sensitivity Group 2	Parameters Special Request	Sensitivity Group 1	Sensitivity Group 2
1) H.C.B.D	0.001		1)		
2)			2)		
3) HCE	0.001		3)		
4)			4)		
5)			5)		
6)			6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
11)			11)		
12)			12)		
13)			13)		
14)			14)		
15)			15)		
16)			16)		
17)			17)		
18)			18)		
19)			19)		

Contact Person J.Osborne

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